

Lymphedema Rehabilitation: Provision and Practice Patterns among Service Providers: National Survey

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Research article

Keywords: Lymphedema, service provision, quality management

Posted Date: November 12th, 2019

DOI: <https://doi.org/10.21203/rs.2.17195/v1>

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Version of Record: A version of this preprint was published at International Wound Journal on June 1st, 2021. See the published version at <https://doi.org/10.1111/iwj.13634>.

Abstract

Background: Information on the current practices and quantification of lymphedema service may be beneficial to promote and improve health care system. Therefore, this study aimed to describe characteristics of lymphedema practitioners, and lymphedema patients' profile, and provide a comprehensive picture of lymphedema service provision in Saudi Arabia.

Methods: A cross-sectional study involved use of an online survey. The survey questionnaires included information about demographic and professional characteristics of lymphedema practitioners, lymphedema profile, questions on the services provided, and perceived barriers in providing a service.

Results: Eighteen lymphedema practitioners (37.50%) responded to the survey. They worked in the major cities: Riyadh (78%), Jeddah (17%), and Dammam (5%), and most of them working in public hospitals (67%). Respondents typically had a background in physical or occupational therapy and had completed a basic training course on lymphedema treatment and management. About 75% of patients seen by practitioners had secondary lymphedema, 47% with breast cancer-related lymphedema. On average 72%, practitioners provide a "comprehensive" lymphedema services. The average number of lymphedema practitioners per service is 2.67. The perceived barriers reported included an inadequate number of certified therapists (100%), difficulties with transportation and lack of financial support (each =72%), and limited space for lymphedema practice/management (89%).

Conclusion: The results suggest that lymphedema practitioners provide a reasonable, but not the optimal, services for lymphedema patients. The service provision is still limited and inequities. Therefore, more staffing is required to promote awareness of the condition and related services, improve referral and care coordination, and enhancing geographical and multidisciplinary coordination of the service.

Background

Lymphedema is a chronic, incurable, progressive swelling because of obstruction or impaired development of lymphatic system leading to the accumulation of protein-rich fluid in the interstitial space [1, 2]. Lymphedema can affect people of all ages and can occur in the limbs and the corresponding quadrant of the trunk, head and neck, or the genitals [1]. Primary lymphedema is related to hereditary dysfunction or malformation of the lymphatic system. Secondary lymphedema is known as acquired and frequently develops secondary to cancer, or cancer-related therapeutic interventions [1, 3], or secondary to non-cancer related conditions, such as vascular insufficiency, trauma, infection, and inflammation [3, 4].

Lymphedema can lead to pain and discomfort as a frequent symptom, with a heightened vulnerability to acute skin infection resulting in frequent hospitalization and long-term use of antibiotics [5].

Lymphedema may produce serious physical, social, and psychological morbidity. Furthermore, increased limb size can interfere with mobility and influence body image with consequent effect on quality of life [6–7]. There is no cure for lymphedema; however, there are several options for treatment aiming to control symptoms and reduce recurrent rate, using complete decongestive therapy (CDT), and exercise therapy [8,

9]. Additional management options include pneumatic pumps [10], low-level laser therapy [11], and kinesiostaping [12].

Understanding the complex nature of lymphedema and its treatment requires competence in risk assessment, early detection, health promotion and complex interventions [10, 12–14]. Within this context, lymphedema practitioners play an important role in service provision leading to improve lymphedema management and increased patient knowledge and self-management of lymphedema [15, 16]. However, there is a limited provision of lymphedema education and a lack of knowledge or awareness among healthcare professionals, leading to underestimation of the conditions prevalence and inequality of services [17–20]. A few reports have examined service provision in Australia [18, 19], Ireland [20], United Kingdom and United State [21–23]. These reported concluded that gaps are evident regarding the provision of current services. Moreover, the services are randomly located, disjointed, and under-resourced [21–23].

Lymphedema has been a rising condition in Saudi Arabia over the last 10 years due to an increase in the incidence of cancer, its related surgical and radiotherapy interventions, and prevalence of obesity [24–27]. There are no data about the prevalence of lymphedema overall in Saudi Arabia. However, the estimated incidence of lymphedema secondary to breast cancer is 14.5% indicating the significance of this condition [28]. In this context, the demand for lymphedema services in the future is expected to increase.

To our knowledge, few practitioners who are qualified to provide a full range of lymphedema services in conjunction with their other job requirements, and the detailed information regarding therapists' practices, patient characteristics, and management techniques have not previously well documented. Therefore, collecting data on the current practices and lymphedema services may be beneficial to promote therapist-based care and the provision of future services, and ultimately, help in developing national health polices and reimbursement procedures for lymphedema management in Saudi Arabia. Therefore, the present study aims to: (1) describe professional profiles of the lymphedema practitioners' currently treating lymphedema patients; (2) describe patient characteristics; (3) explore the availability of lymphedema services and referral pathways; and (4) determine the potential barriers to lymphedema management from therapists' perspectives.

Methods

Study design and Participants

This study was a descriptive, cross-sectional online national survey. Potential sample included all members of Saudi physical therapy lymphedema group. This group is a special interest group of the Saudi Physical Therapy Association (SPTA) and includes practitioners participating in providing lymphedema services. The study was approved by the Institutional Review Board of the College of Applied Medical Sciences, King Saud University, Saudi Arabia (Protocol No. CAMS 079–3839).

Survey questionnaire:

The study questionnaire was modified and adapted from a literature review and an earlier questionnaire developed by American Lymphedema Framework Projects [18–23]. A modification was made to report the differences in the healthcare settings and to understand what health care services are actually provided in these clinical settings. Before distribution, the survey was pilot-tested by three health care practitioners' expert in lymphedema management to ensure clarity, feasibility, and comprehensiveness. Finally, the online version was generated and consisted of 53 health-related questions which were separated into four different sections to obtain a snapshot of the current practice of lymphedema management.

The first section comprised demographic, and work related characteristics of lymphedema practitioners. The second section was about lymphedema patients' profile, such as current caseload; types of lymphedema; percentage of primary and secondary lymphedema; percentages of male and female patients, age groups, and initial causes; and percentage of the area involved. The third section was about the current assessment and interventions, as well as risk reduction and factors influencing their decision on lymphedema management. The fourth section is about the service provision, standard of care and barrier of the services.

The response options included the selection of the proposed answer, yes/no, four Likert scales (e.g. never used, rarely used, occasionally used, frequently used), and five Likert scale (e.g., strongly agree, agree, natural, disagree, strongly disagree), and comment after the specific item. At the end of the questionnaire, respondents were asked to complete two open-ended questions. The first open-ended question related to what factors they thought are important to patients attending lymphedema services. The second open-ended question related to what recommendations therapists would make if they could influence policy on lymphedema service development.

Data collection:

An online survey was administered via a secure online platform, Goggle Survey. The contact email addresses were identified from the databases of Saudi Physical Therapy Association (SPTA) and the Saudi Occupational Therapy Association (SOTA). An email containing invitations, a link to the web survey, a detailed information about the aim of the study and a statement that assured participants' confidentiality and anonymity of their response was delivered to the participants, announcing they will be emailed the survey in one week. A consent form was not required, and was assumed by completion of the survey. The invitation was sent under the signature of study groups. Email invitations and reminders were sent three times over a 3-month period. At the end of this 3- month period, the survey was closed. The electronic data were kept on a password secured computer and hard-copy data were kept on research files. Supplementary material related to the survey questionnaire can be found, in the online version at <http://dx.doi.org/10.1016/j.ijnurstu.2015.09.001>.

Statistical analysis

Data obtained from the surveys were entered into Microsoft Excel 2016 and imported to SPSS (version 25.0, ©IBM Corporation, NY, US). One of the authors checked the data for errors by comparison with the raw data correcting any data entry anomalies. Descriptive statistics included percentages, frequency distributions, means and medians were used to summarize therapists' characteristics, and provide data on current practice for lymphedema. The level of significance was set at $P < 0.05$. Responses were collected and analyzed, initially using the Google Survey software and again with SPSS (version 21.0, IBM, NY, USA).

Results

Demographic and professional profile of lymphedema practitioners

The questionnaires were sent to 53 registered members in the SPTA lymphedema research group. The overall response rate was 90.6% (48). Among them, 30 respondents showed that they would not complete the questionnaires as they do not provide a lymphedema service, not working as lymphedema therapists, and/or practice without a certificate. Finally, eighteen lymphedema practitioners (37.5%) completed the questionnaires.

Table 1 lists the demographic and professional characteristics of lymphedema practitioners. The majority of responders were females 14 (78%). Approximately 83% of responders' age were between 21 and 39 years old, while 17% were above 40 years old. More than two-thirds of the lymphedema practitioners were Saudi (78%). All of the respondent were physical therapists ($n = 17$), except one was an occupational therapist. Almost 72% of the responders had ≤ 5 years' experience as lymphedema practitioners, whereas 6% had between 6 and 10 years' experience, and 22% had >10 years' experience.

Results revealed that 22.22% (4/18) of the respondents had received the undergraduate education regarding lymphedema management. The most frequent type of education undertaken was courses and /or occasional lecture. The vast majority of lymphedema practitioners (89%) completed basic training of 135-hour from one of the lymphedema schools (Foldi, Klose, ACOLS), and only seven lymphedema practitioners held specialization within lymphedema therapy. However, none of lymphedema practitioners reported they were certified by the Lymphology Association of North America (LANA).

All the respondents reported keeping update with progressed development education through self-directed learning (50%), workshops/conferences/seminars (28%), and through supervised clinical placement training and in-service training (both = 22%).

In terms of the training needs, lymphedema practitioners agreed that modules in the lymphatic system and lymphedema should be taught to all relevant disciplines (e.g. physical and occupational therapists) at both the undergraduate level (72%) and postgraduate level (28%). Most lymphedema practitioners rated themselves as "Excellent" or "Very good" in terms of knowledge ($n = 14$), competence ($n = 11$), and

confidence (n = 11), and lowest in terms of how experienced they felt. Ten (78%) of lymphedema practitioners did not think there were sufficient opportunities for professional development.

Lymphedema patient's profile

Tables 2 lists patients were seen in the last year by lymphedema practitioners. The respondents listed that 68% of patients attending their clinic were females. The lymphedema was more common in the age range of 19–65yrs (76 %), followed by geriatric \geq 65yrs (16%) and pediatric (8%). Most patients seen by lymphedema practitioners had secondary lymphedema (75%), while 25% had primary lymphedema. Eighty-nine of the respondents reported BCRL as the predominant type of lymphedema (47.28 ± 36.12), while patients with lymphedema due to other types of cancer (e.g. gynecological cancer, prostate cancer, and lymphoma), and tissue damage, and inflammation were rated as the much smaller mean percentage (all = 14%). Nearly 15% of patients had lymphedema secondary to immobility/dependency and phelbolympedema. According to the survey respondents, the average percentage with mixed lymphedema (wound + lymphedema) was 17.50%. The most common location of lymphedema was in the unilateral upper limb (50%), followed by bilateral lower limb (36%), and unilateral lower limbs (33%). The mean percentages reported for head and neck, genitals, and 'other' were low (all \leq 6%).

Characteristics of Lymphedema service

Most practitioners worked in the major cities; Riyadh (78%), Jeddah (17%), and Dammam (5%). The most common practice settings reported among the survey respondents included: public hospital (67%), private practice (28%), and community cancer centers (5%). Within these clinical settings lymphedema practitioners provided outpatient services (83%), inpatient services (67%), and home-care services (5%).

In general, 72% of practitioners provided 'comprehensive' lymphedema management, including four or more of the services (e.g. manual lymph drainage, bandage and garment prescription, exercises, and education), while the remaining practitioners (28%) provided less than four of these services and were classified as offering 'standard' lymphedema management. The practitioners offered a range of services, in addition to the comprehensive lymphedema management. Over one-third of the responding therapists prescribed pneumatic compression devices and kinesiotaping, while \leq 16% of lymphedema practitioners reported offering laser therapy and/or aquatic therapy. Concerning lymphedema wound management, 50% respondents offered wound service to 17.50% of their patients on average.

The average capacity of services reported by lymphedema practitioners for initial consultation was 22 % patients, 10% for intensive treatment and 22% for follow-up (e.g. approximately 54 patients). On average, lymphedema practitioners have approximately 14% patients for the initial consultation per month, 9% for intensive treatment and 19% for follow-up (e.g. approximately 42 patients). In addition, lymphedema practitioners have approximately a mean percentage of 4 patients for the initial consultation per month, 4 for intensive treatment and 4 for follow-up on the waiting list (e.g. a total of approximately 12 patients).

Lymphedema practitioners were asked to report how many multidisciplinary staff were employed in their service for the treatment of lymphedema. More physical therapists (3) were employed in the treatment of lymphedema than any other profession. No lymphedema practitioner reported working in a service that had a social worker, psychologist, or psychiatrist.

The most common referral sources were oncology department (78% from surgeons, 72% from radiation oncologists, and 22% from medical oncologists), followed by dermatologists (61%), podiatrists (39%), and only 17% had patients' self-referring. On average, 44% of lymphedema practitioners received referrals of lower than 10 cases per month, and approximately 44% had received 11–20 new referral cases per month, and only 12% of lymphedema practitioners had referral > 20 cases per month.

Service standards and potential barriers.

Practitioner ratings of the standard of care received by patients with different types of lymphedema were presented in Figure 2. Overall, patients with non-cancer-related secondary lymphedema were rated as receiving the lowest standard of care, while patients with breast-cancer-related lymphedema were rated as receiving the highest standard of care. About 22% of lymphedema practitioners rated the standard of care for people with primary lymphedema as very low or low. Approximately 28% of lymphedema practitioners rated the standard of care for people with non-cancer related lymphedema as very low or low; 17% of lymphedema practitioners rated the standard of care as low or very low for people with lymphedema secondary to other types of cancers; and no lymphedema practitioners rated the standard of care for breast cancer-related lymphedema as very low or low.

Table 4 represents the potential barriers reported by lymphedema practitioners during providing the lymphedema services. Most of the lymphedema practitioners agreed that, healthcare provider-related barriers were among the most commonly encountered difficulties and included an inadequate number of certified therapists (100%), and lack of awareness of lymphedema management among other medical professionals (78%) and therapists (72%), Insufficient information regarding lymphedema management (skin care, exercises, MLD, bandages) for patients (67%). Patient-related barriers included difficulties with transportation and lack of financial support (each = 72%), followed by lack of social support and motivation from lymphedema patients (each = 67%), as well as limited physical activities (67%). Interestingly, patients-related barriers such as poor treatment compliance dissatisfactions with the treatment program (44% and 33%) were among the least encountered difficulties. Interestingly, system-related barriers such as limited space for lymphedema practice/management (89%), lack of administrative support (78%), and insufficient accesses to trained therapists particularly in the rural area (72%), were among the most encountered difficulties, while barriers related to adequate referral systems were among the least encountered difficulties.

Discussion

This is the first survey to identify and characterize the provision of lymphedema services in Saudi Arabia. Research and clinical interest in the management of lymphedema have increased considerably over the past decade. Furthermore, there were no available data to assess the structure and proficiency of this practice. The results of this study broadly suggest that lymphedema practitioners provide a reasonable, but not optimal, service for those with lymphedema.

In the current study, the majority of lymphedema patients were females with an age range of 19–65yrs. The majority of patients had secondary lymphedema (75%), and 63% had breast cancer-related lymphedema. These results are compatible with the characteristics of the lymphedema population as reported in the literature review [3, 29, 30]. A recent survey from the US reported that 84% of patients treated had secondary lymphedema and 59% had oncology-related upper extremity lymphedema [29], while a study from Ireland reported that 87% of patients had secondary lymphedema [31].

In the current survey, only 11% of lymphedema practitioners showed that their service provided home care, in comparison with 19% and 79% of services in Dublin [34], and Australia [32]. The average number of lymphedema practitioners employed were very low (2.67; range 1–4), and most of them might be required to treat patients with other conditions. None of the respondents reported that their services had social, psychological or psychiatric employments. These results are consistent with finding from Victoria [32] and Dublin studies [31]. These studies showed that there were an insufficient numbers of lymphedema practitioners who providing lymphedema services and this was considered as the perceived barrier reported by all the lymphedema practitioners in the current study. In addition, no or inadequate number of social workers, psychologists, or psychiatrists employed in the treatment of lymphedema patients [31, 32]. In contrast, best practice guidelines and literature reviews suggest that lymphedema management requires multidisciplinary and multimodal services [33–38], as lymphedema has a significant impact on the patient's emotional, physical, social and psychological aspect [6, 38–41].

On the other hand, the average number of patients seen per month for various consultations was high, at approximately 43 patients, while the average number of patients on waiting lists for these consultations was also quite high 33 patients. These reflected the higher caseload of the services. This might be attributed to limited space for lymphedema practice/management as lymphedema services were provided in the large public hospital (83%) and are within the larger urban areas with an inadequate number of certified therapists. All these lead to poor perception about the standard of services provided to patients both in rural areas and had non-cancer-related lymphedema compared to patients living in large cities and had cancer-related lymphedema. These results are compatible with the Murray et al., 2010 findings from Dublin [31] and United Kingdom (UK) [39, 40] who highlighted that patients living in rural areas may receive poorer lymphedema service. However, two-third (72%) of practitioners provide the 'comprehensive' lymphedema management, including four or more of the services (e.g. manual lymph drainage, bandage and garment prescription, exercises and education), while the remaining practitioners (28%) provided less than four services and were classified as offering 'standard' lymphedema management. These are essential for the effective management of lymphedema as reported by international consensus [35].

In this survey, medical practitioners including oncologists, dermatologists, physiatrists and podiatrists were the most common sources of the referral for the services and practitioners responding to the questionnaire. This might be attributed to lack of awareness of lymphedema management among other medical and healthcare professions, in particular general practitioners. These results are in agreement with the previous reports [31, 32, 41–43] who showed a poor awareness of lymphedema and lymphedema services among health care professionals which considered as a barrier to service access [42,43].

In summary, the inequitable nature of current lymphedema service provision was demonstrated by the location of practitioners, and variations in service provision for patients with different types of lymphedema, and referral pathways and perception of the standard of service provided by lymphedema therapists. These results are similar to the findings from previous studies of service provision from Australia [44], Ireland [42], and the UK [39] and Scotland [30]. However, there is a need to validate the findings by the inclusion of patients' perspectives.

In the current survey, the largest percentage of respondents who delivered lymphedema services are physical therapists (94.40%), and an occupational therapist (5.60%). These findings are similar to the findings of previous studies. These studies reported that lymphedema practitioners came from the multidisciplinary health care team [28, 30–32, 44]. Notably, physical therapists appear to be involved in delivering most of the rehabilitation services available [29, 31, 32]. In addition, most lymphedema practitioner (77.8%) met the certification-training requirement and none of them had received LANA certification. These results are consistent with the previous studies from the US [32], Dublin [31], Scotland [30] and Australia [32], where a variability in percentage of practitioners with specialized training ranged from 23% to 93% among the respondents.

Approximately, (78%), of lymphedema practitioners highlighted the perceived need for further learning and updating in the current survey. These are compatible with previous studies by Sneddon et al. (2008) who indicated that 79% of lymphedema specialties reported that they need further learning and updating of skills[30], while a study conducted by Davies et al., 2016 [45] indicated that two-thirds of lymphedema specialties needs keeping up to date. However, there was variability in methods for addressing education needs as reported in the current study, such as self-directed learning, reading relevant journals, and attending lectures, workshops, conferences and seminars on lymphedema. Despite that, 72% respondents in the current survey reported they did not think there were sufficient opportunities for professional development, while this percentage increased to 94% in the study conducted by Murray et al., 2010 [31]. These results might reflect insufficient education about lymphedema in undergraduate health care programs, high caseload, and difficulties in getting study leave and funding. All of these present barriers to the practitioners and need continuous professional development.

Conclusion

The results of this study suggest that lymphedema practitioners provide a reasonable but not optimal service for lymphedema patients. Furthermore, the service provision is still limited and inequities to people with lymphedema. Therefore, more staffing are required to promote awareness of the condition and related services, improve referral and care coordination, and improve geographical and multidisciplinary coordination of the service.

Availability Of Data And Materials

The datasets used and analyzed during the current study and included in this manuscript are available from the corresponding author on reasonable request.

Abbreviations

ACOLS: Academy of Lymphatic Study

CAMS: College of Applied Medical Sciences

CDT: Complete Decongestive Therapy

LANA: Lymphology Association of North America

MLD: Manual Lymph Drainage

SOTA: Saudi Occupational Therapy Association

SPTA: Saudi Physical Therapy Association

UK: United Kingdom

US: United State

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Ethical Declarations

Ethics approval and consent to participate

The study was approved by the Institutional Review Board of the College of Applied Medical Sciences, King Saud University, Saudi Arabia (Protocol No. CAMS 079-3839). A consent form was not required, and was assumed by completion of the survey.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Acknowledgments

The authors extend their appreciation to the Deanship of Scientific Research at King Saud University for funding this work through research group No (RG-1440-057)

Conflict of Interest Disclosures

The authors declare no financial conflicts of interest.

Contributions

MO drafted the manuscript, and conducted data analysis of the study. NAD and RG were involved in designing of the study, data analysis and revised the manuscript. JA provided overall guidance to prepare the manuscript revised the survey, and acted as a mentor. Authors read and approved the final version of the manuscript.

Tables

Table 1: Demographic and professional profile of lymphedema practitioners (n=18)

Characteristics	N	(%)
Genders		
Female	14	(78)
Male	4	(22)
Age (years)		
21-29	4	(22)
30-39	11	(61)
40-49	3	(17)
>50	0	0
Nationality		
Saudi	14	(78)
Non-Saudi	4	(22)
Educational background		
Physical therapist	17	(94)
Occupational therapists	1	(6)
Years practice as lymphedema Therapist		
0-1 year	6	(33)
2-5 years	7	(39)
6-10 years	1	(6)
>10 years	4	(22)
Sources of lymphedema educations/ training		
Undergraduate	4	(22)
Postgraduate diploma	1	(6)
Basic lymphedema training/certificate	16	(89)
Advanced/specialized lymphedema courses/training	7	(39)
Sources of keeping Up-to Date		
Self-directed learning	9	(50)
Workshop/conference/seminar/lecture	5	(28)
Supervised clinical placement	2	(11)
In-service training	2	(11)
Training needs by lymphedema practitioners		
Undergraduate modules on lymphatic system and lymphedema	13	(72)
Postgraduate modules on lymphatic system and lymphedema	5	(28)
Specialized lymphedema training	0	(0)
Continuous professional lymphedema development courses	0	(0)
Sufficient opportunity for professional development		
No	14	(78)
Yes	4	(22)

Table 2. Lymphedema patients' profile

Characteristics	Mean ± SD	Range
Gender N (%)		
Male/females	32%/68%	
Age Range (yrs.)		
Pediatric 1-18yrs	10.83±14.99	0-60
Adults 19-65yrs	75.05±19.74	20-100
Geriatric ≥ 65yrs	17.44±16.55	0-70
Percentage of patient with lymphedema		
Primary lymphedema	25.22±27.17	0-90
Secondary lymphedema related to breast cancer	47.28±36.12	0-98
Secondary lymphedema related to other types of cancers	6.36±7.71	0-30
Lymphedema Secondary to Trauma/inflammation	7.61±9.16	0-30
Lymphedema Secondary to vascular diseases	10.50±11.92	0-40
Lymphedema Secondary to immobility/dependency	3.33±3.75	0-10
Sites of lymphedema		
Unilateral upper limb	50.00±38.35	0-98
Bilateral upper limb	6.22±12.07	0-50
Unilateral lower limb	33.17±31.84	0-90
Bilateral lower limb	36.00±32.53	0-100
Head and neck	1.28±2.71	0-10
Trunk/taros/breast	15.94±23.57	0-80
Genitals	4.27±11.83	0-50
Lymphedema		
Lymphedema only	82.50±18.60	50-100
Mixed (skin wound and lymphedema)	17.50±18.49	0-50

Table 3. Characteristics of Lymphedema service.

Characteristics	N	(%)
Geographical location of services		
Riyadh	14	(78)
Dammam	1	(5)
Jeddah	3	(17)
Location of services		
Hospital	12	(67)
Private practice	5	(28)
Community health center	1	(5)
Therapist practice settings		
Outpatient clinic	15	(83)
Inpatient clinic	12	(67)
Home care	1	(5)
Types of lymphedema services		
Comprehensive lymphedema service	13	(72)
Standard lymphedema service	5	(28)
Other types of lymphedema services		
Wound management	9	(50.00)
Pneumatic compression pump	6	(33.33)
kinesio-taping	6	(33.33)
Laser	3	(16.67)
Aquatic therapy	2	(11.11)
Capacity of lymphedema services/month mean \pm SD (range)		
Initial consultation (e.g. education, skin care, SLD)	22.11 \pm 18.88	0-70
Intensive Treatment (e.g. MLD/MLLB)	10.17 \pm 8.96	0-28
Follow up appointments	21.50 \pm 22.50	0-70
Patients Seen by Practitioner/month mean \pm SD (range)		
Initial consultation (e.g. education, skin care, SLD)	14.00 \pm 13.63	0-50
Intensive Treatment (e.g. MLD/MLLB)	9.00 \pm 18.92	0-80
Follow up appointments	19.00 \pm 18.92	0-70
Patients on Waiting List /month		
Initial consultation (e.g. education, skin care, SLD)	4.00 \pm 6.49	0-20
Intensive Treatment (e.g. MLD/MLLB)	4.00 \pm 9.24	0-40
Follow up appointments	4.00 \pm 11.67	0-50
Average number of staff employed in each service mean \pm SD (range)		
Physical therapists	2.67 \pm 0.90	1-4
Occupational therapists	0.39 \pm 0.78	0-3
Nurses	0.39 \pm 0.78	0-2
Social workers	0	0
Psychologists	0	0
Administrative staff	0.72 \pm 1.48	0-5
Referral Sources to lymphedema practitioners N (%)		
Oncology surgeons	14	(78)
Radiation oncologists	13	(72)
Medical oncologists	4	(22)
Patient self-referrals	3	(17)
Dermatologists	11	(61)

Vascular Specialists	3	(16.67)
Podiatrists	7	(39)
Primary Care Physicians	3	(17)
Physiatrists	5	(28)
Number of referral per month		
< 10	8	(44.44)
11-20	8	(44.44)
>20	2	(11.11)
Mode of service payment		
No payment (governmental/semi-governmental/hospital)	16	(88.89)
Employed based health insurance	3	(16.67)
Private insurance	4	(22.22)
Self-payment	3	(16.67)
Charity	1	(5.5.6)

MLD; manual lymph drainage, SDL: self-lymph drainage, SD: standard deviation

Table 4. Potential barriers reported during the lymphedema management (n=18)

Barriers	N (%)				
	Strongly agree	Agree	Natural	Disagree	Strongly Disagree
Lack of awareness of Lymphedema Management among Therapist	6 (33.3)	5 (27.8)	4 (22.2)	2 (11.1)	1
Inadequate number of Certified Therapists	10 (55.6)	8 (44.4)	-	-	-
Lack of awareness of lymphedema management among other Medical professions	11 (61)	3 (16.7)	3 (16.7)	-	1 (5.6)
Insufficient information regarding Lymphedema management (skin care, exercises, MLD, Bandages) for patients	7 (38.9)	5 (27.8)	3 (16.7)	2 (11.1)	1 (5.6)
Lack of financial support	7 (38.9)	6 (33.3)	1 (5.6)	6 (33.3)	6 (33.3)
High cost of treatment	9 (50)	2 (11.1)	33 (16.7)	6 (33.3)	6 (33.3)
Lack of social support and motivation from lymphedema patients	6 (33.3)	6 (33.3)	1 (5.6)	3 (16.7)	2 (11.1)
Limited physical activities (e.g. walking, transferring, arm morbidities)	7 (38.9)	5 (27.8)	3 (16.7)	2 (11.1)	1 (5.6)
Difficulties with transportation and logistics	5 (27.8)	8 (44.4)	1 (5.6)	3 (16.7)	5 (27.8)
Patient dissatisfactions with treatment program	2 (11.1)	4 (22.2)	5 (27.8)	5 (27.8)	2 (11.1)
Poor treatment compliance among lymphedema patients	5 (27.8)	3 (16.7)	4 (22.2)	3 (16.7)	5 (27.8)
Limited space for lymphedema practice/management	10 (55.6)	6 (33.3)	-	1 (5.6)	1 (5.6)
Lack of adequate referral system	4 (22.2)	4 (22.2)	8 (44.4)	2 (11.1)	-
Lack of administrative support	7 (38.9)	7 (38.9)	3 (16.7)	5 (27.8)	1 (5.6)
Insufficient accesses to trained Therapists, particularly in rural area	8 (44.4)	5 (27.8)	2 (11.1)	1 (5.6)	2 (11.1)

MLD; manual lymph drainage

Figures

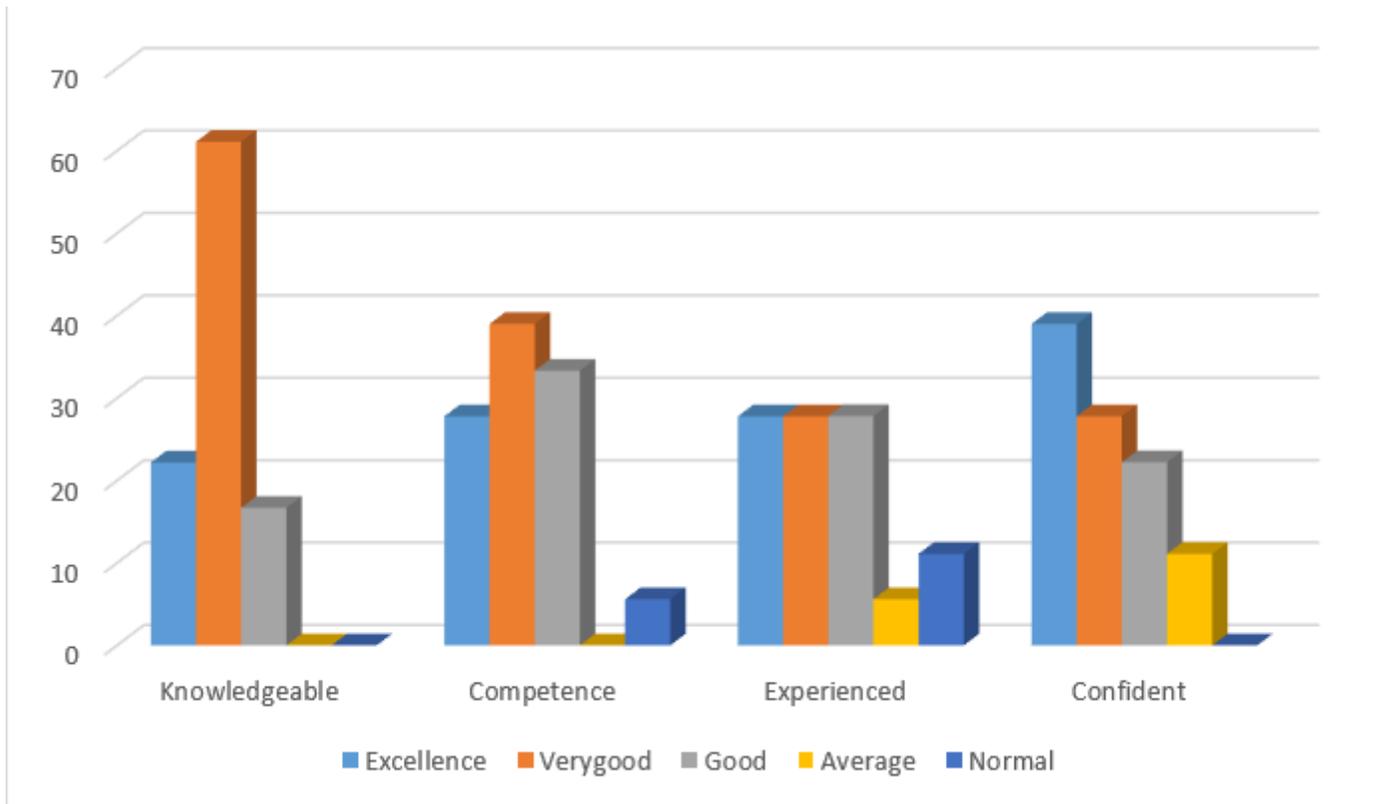


Figure 1

Practitioners' ratings of the professional development

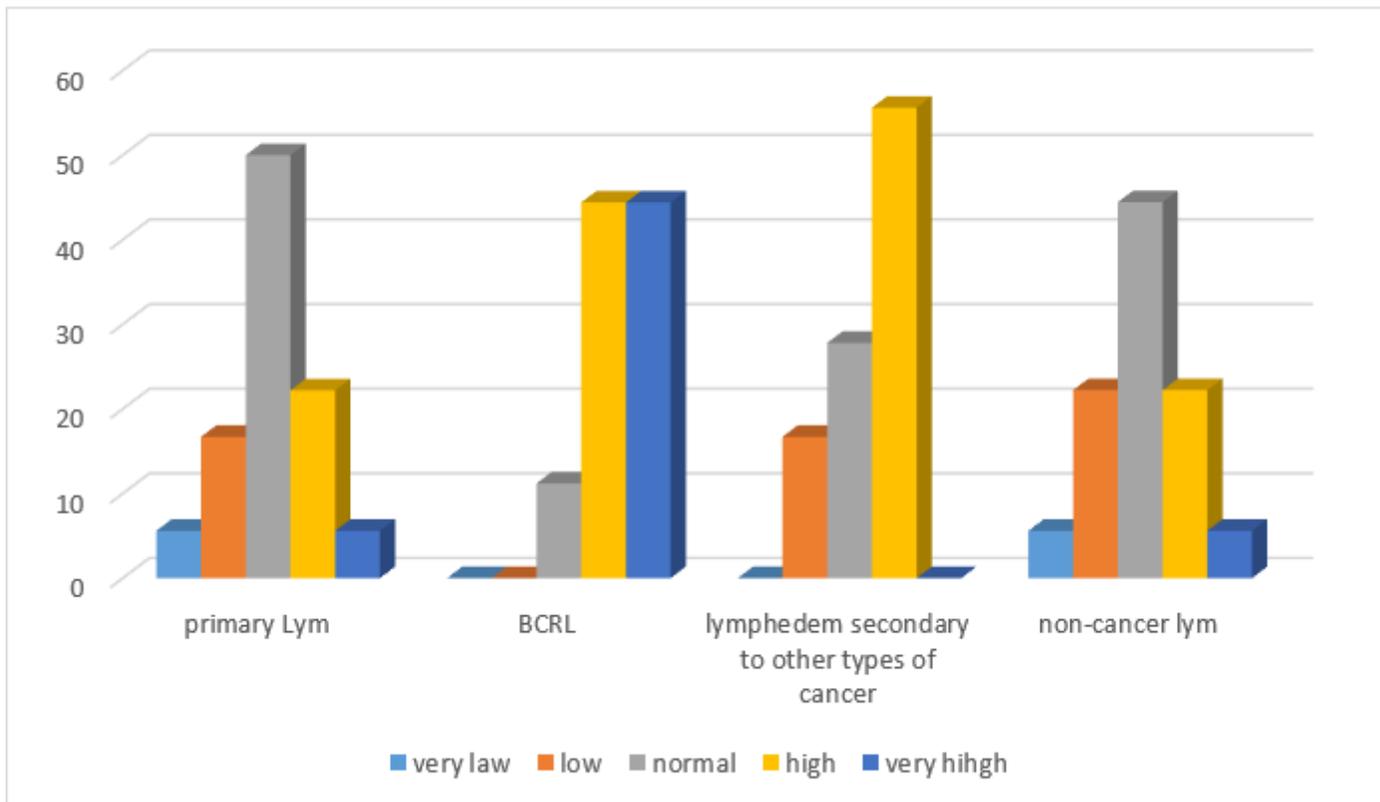


Figure 2

